CONFIRMED MINUTES

IHRA SIDE IMPACT WORKING GROUP

7th MEETING

MADRID, SPAIN

07-08 FEBRUARY 2000

ATTENDEES

Keith Seyer	(Chair)	Department of Transport & Regional Services, Australia
Craig Newland	(Secretary)	Department of Transport & Regional Services, Australia
Dainius Dalmotas		Transport Canada
Suzanne Tylko		Transport Canada
Richard Lowne		EEVC
Joseph Kanianthra		National Highway Traffic Safety Administration, USA
Robert Hultman		OICA North America / AAM
Rainer Justen		OICA Europe
Takahiko Uchimura		OICA Asia Pacific / JASIC / JAMA
Risa Scherer		WorldSID Task Group
Haruo Ohmae		JARI
Hideki Yonezawa		JMoT
David Zuby		Insurance Institute for Highway Safety
Javier Paez		INSIA

APOLOGIES

No apologies were received.

MODIFICATIONS TO AGENDA

Items 6.1 (Global injury distributions for non-struck side occupants) was deleted from the draft agenda.

Item 8.2 (Load cell wall data from US NCAP Full Frontal tests) was deleted from the draft agenda.

The revised agenda was accepted as amended. The modified agenda has Document Number SIWG 70.

MINUTES OF THE PREVIOUS MEETING

The draft minutes of the sixth meeting, held in San Diego, California were amended, approved and confirmed. The only correction was to correctly indicate that the Ford Mondeo was a European vehicle model and the Contour was marketed in the US. These had been incorrectly been denoted as US and US variants in the draft minutes. Mr Newland to issue an updated version (refer Document SIWG 69).

WORLDSID TASK GROUP UPDATE

Ms Scherer summarised the activities of the WorldSID Task Group.
Members of the WorldSID task group will be presenting a paper at the Government/Industry Congress 19-21 June 2000 in Washington, describing the rationale for the anthropometry and mass selections for WorldSID.
The next WorldSID task group meeting is scheduled for 03 April 2000 to be held in Munich.
All contracts with design team members have been signed. Almost all funding as been received (except for funds committed by Australia which have not yet been received).
Progress of the development of each body region of WorldSID is to be discussed at the WorldSID meeting scheduled for 09-10 February 2000 in Madrid.
A proposal for masses of WorldSID body segments is ready for presentation to the IHRA Biomechanics Working Group for consideration.
Timing is still on track for the WorldSID workshop scheduled to be held in October in Australia. A complete dummy is expected to be available by this time.

PRESENTATIONS FROM IIHS

Parametric Study
David Zuby from the Insurance Institute for Highway Safety delivered a presentation describing the IIHS side impact parametric crash test evaluation (reported at the 1999 Stapp conference). This document has reference number SIWG 73.
This test program investigated the parameters influencing injury risk for passenger car occupants in side impact collisions where the striking vehicle is a pickup or SUV. There have been similar studies conducted, including mobile barrier and computer modelling studies, however, IIHS wished to use vehicle to vehicle crashes to overcome the possible limitations of previous work. Tests were conducted with the target vehicle travelling at 24 km/h perpendicularly to the bullet vehicle travelling at 48 km/h. A BioSID driver dummy with the arm in the “down” position was used in the target vehicle. In each case the target vehicle was a Crown Victoria Grand Marquis. Bullet vehicles used were Lincoln Town Car, and Ford F150 4x2 and 4x4. In all but one test involving an SUV bullet vehicle, the BioSID dummy in the target car struck its head on the hood of the SUV.
“End shifting” (bending deformation of the front rails in the lateral direction) was observed in both the 4x2 and 4x4 F150 bullet vehicles.
The BioSID injury risks from the 4x4 F150 were lower than those obtained with the 4x2 F150, despite the fact that tests had been conducted with a 4x2 raised and ballasted to 4x4 ride hight and mass specifications, and the fact that the 4x4 has a higher front-end stiffness. The lower injury risk from the 4x4 was due to the fact that

the 4x4 has tow hooks that engaged the sill of the target car. In addition, the 4x4 bumper is different to the 4x2 bumper, leading to a flatter intrusion profile. Velocity-time history plots showed that the 4x4 applies loads to the spine and pelvis of the BioSID dummy fairly equally (i.e. the target car achieves a vertical intrusion profile), whereas the 4x2 does not promote this same phenomenon.
IIHS concluded that the effects of stiffness can be mitigated by front-end design.

Thoracic Trauma Index (TTI) readings from the BioSID indicated that mass has the largest effect. All other injury measures indicated that geometry (ride height) has the greatest influence on injury risk.

These conclusions concur with other similar studies conducted by Transport Research Laboratory (computer modelling) and the mobile barrier parametric test program jointly conducted by Australia and Transport Canada.

Side Airbag OOP Injury Technical Working Group
David Zuby also reported on the activities of the Side Airbag OOP Injury Technical Working Group chaired by Adrian Lund from IIHS (Document number SIWG 74). This group includes the Alliance of Automobile Manufacturers (AAM), Association of International Auto Manufacturers (AIAM), Automobile Occupant Restraints Council (AORC), Insurance Institute for Highway Safety (IIHS) and US Council on Automotive Research (USCAR) as participants.
It was noted that neither Transport Canada nor NHTSA have reported any cases of death attributed to a side airbag. NHTSA have one reported case of a side airbag injury involving a 74 year old with a thoracic injury.
The Technical Working Group is not considering the following issues:

- effectiveness of side airbags
- implementation of standard procedures and criteria
- public information regarding OOP side airbag risks by make and model
- federal regulations

In addition, due to time constraints, the issue of testing for side airbag suppression systems will not be investigated and there will be no recommendations regarding this topic. However, the group will recommend testing the most vulnerable situation for which the airbag will deploy.
The group is utilising ISO TC22/SC10/WG3 test procedures and US OOP frontal airbag performance criteria as a starting point for their work. Existing dummies will be used. Dummy development is not an activity of the group. Hybrid III 3 year old, 6 year old and 5th percentile adult female dummies, as well as the SID IIs will all be recommended in the final report. Smaller dummies are not expected to be recommended because of increasing use of child restraints and the consequent reduction in risk of OOP exposure for small children.
The test/s to be recommended will always use the full system, for example deploying both door and roof mounted airbags simultaneously. Possible additional tests may be required.
The following test conditions are expected to be recommended:

For seat mounted airbags:

3 year old Hybrid III	- Forward facing, on booster (against side airbag)
	- Rearward facing child (peek-a-boo) chest near airbag

	- Lying across seat (head near door)
6 year old Hybrid III	- Forward facing on booster (as per 3 year old, but taller)
SID IIs	- Inboard facing (leaning against door)
	- Instrumented arm on armrest

For side (door) mounted airbags:

3 year old Hybrid III	- Outboard facing (chest to door)
	- Inboard facing (head to door)
	- Lying across seat, head on armrest
SID IIs	- Forward facing, leaning against door

For roof mounted airbags:

6 year old Hybrid III	- Inboard facing (back to door)
SID IIs	- Inboard facing (back to door)
	- Forward facing (head near window)

Injury assessment reference values will be published for HIC15, all 6 measurement axes of the Upper and Lower neck load cells, thoracic rib deflection and V*C, chest acceleration, SID IIs abdominal rib deflection and V*C and SID IIs humerus and ulna moments.
A public meeting is scheduled for 29 February 2000, with recommendations to be submitted to NHTSA by April 2000.

Mr Kanianthra noted that NHTSA will also conduct dynamic OOP tests and some tests to look at the effectiveness of side airbags, testing the same vehicle models with and without side airbags. However, NHTSA have no regulatory plans at this stage.

Mr Seyer reiterated to the group that the intention of the group in specifying appropriate side airbag OOP test procedures was to rely on the NHTSA/Transport Canada work.

Mr Hultman pointed out that the advantage of static testing is the speed of testing and results. He noted that dynamic testing may be required, but that engineering judgement would come into play on this issue.

Mr Lowne commented that the IIHS work is valuable, but the frontal airbag OOP concern has been transferred to side airbags and this may not be appropriate. Mr Lowne expressed concern that effectiveness was not being considered, particularly with respect to suppression systems. For example, in a frontal crash, a restrained child would be unlikely to contact the vehicle interior structure and the frontal airbag poses a risk, however, for a side impact the child is up against the deforming (intruding) structure and suppression of the airbag may not be appropriate as the airbag may offer some benefit with negligible risk.

PRESENTATION OF ACCIDENT STUDIES

EEVC - Head contact zones in side impact crashes

Mr Lowne presented data showing the head contact zones of vehicle occupants involved in side impact crashes (Document SIWG 75). Data from TRL, BASt, NHTSA and Hannover was presented. The TRL data shown was for drivers and passengers, both restrained and unrestrained, with injuries AIS 1+.
For front, struck side, restrained occupants, there were 4 cases with evidence of head contact to the door below the belt line, 10 cases with contact to the A pillar and 13 cases with contact to the B pillar.
There were also a significant number of cases of head contact to interior for non-struck side occupants.
Mr Lowne noted that head injuries due to contact to the vehicle interior in side impact crashes are worst when the side structure is deformed and supported. Since head contact to the vehicle interior is usually not simulated in mobile barrier tests, Mr Lowne proposed to add the consideration of a subsystems head contact test to the “strawman”.

This proposal was supported by the EEVC, NHTSA and Transport Canada.

The Japanese government representative said that Japan did not yet have conclusions from research on this issue, but they were considering an FMVSS201 type of test.
Mr Hultman said that there is a need to consider head impact. He also noted the need to test on a new piece of trim for each FMVSS201 impact test, due to possible changes to the properties of the test specimen from each impact.
Mr Uchimura stated that there is currently no Japanese data to support the conclusion of head contact to vehicle interior in side impact accident studies.

NHTSA – Evaluation of FMVSS 214 Dynamic Side Impact Protection

Mr Kanianthra presented the results of phase one of an evaluation of FMVSS 214 Dynamic Side Impact Protection (Document SIWG 76). The analysis reviewed the average value of TTI[d] recorded on the US SID for 2 door and 4 dor vehicles in model years 1981-1990 (pre FMVSS214 Dynamic), 1993 (after FMVSS214 dynamic was issued in 1990) and 1997 (at which time FMVSS214 dynamic was applicable to all vehicles). The results showed a small decrease in the average level of TTI[d] in 1993, with the average TTI[d] decreasing by approximately twice this amount by 1997. The effect was more significant for 2 door vehicles. The average value for TTI[d] for 4 door vehicles 1981-1990 was 80g, whereas the regulatory limit for these vehicles imposed by FMVSS214 was 85g.
The presentation also described a study of the relationship of TTI[d] to injury severity in real world crashes. The results showed that the relationship of TTI[d] and side impact fatality risk is statistically significant for 2 door cars, which showed the strongest correlation in every analysis (24% in all side impacts); 2 door cars also showed high correlation even in fixed object impacts. However, 4 door cars showed a weaker relationship, usually not statistically significant (9 % in all side impacts).

A complete report on the evaluation of FMVSS 214 is available on the NHTSA website at www.nhtsa.dot.gov/cars/rules/regrev/evaluate/pdf/809004.pdf

JAPAN – Proportion of females injured in car-to-car crashes in Japan

Mr Ohmae presented the results of an analysis of 1996-1998 fatal and serious injury data (Document SIWG 77). The number of struck side injuries was the same for males and females. For non-struck side injuries, there were fewer females than males. The data showed that there are approximately 70 million drivers in Japan, with almost equal numbers of males and females. The fatality rate for males and females is similar. The data is now being analysed for age breakdowns.

Information was also presented for side impact crashes involving rear seat occupants. It was shown that 14% of all side impact fatalities are rear seat occupants, and 11% of all injured occupants in side impact crashes are seated in the rear. Japan does not at this moment consider a rear seat dummy in the side impact test, but will consider the latest information for future regulation.

Data showing the relationship between the severity of injuries in the struck vehicle and the velocity of the struck vehicle indicated that for struck vehicle velocities up to 25 km/h the injury severity was unaffected by velocity.

Mr Ohmae was requested to determine the cumulative distribution of struck vehicle velocity for struck side impacts involving rear seat passengers for low severity, serious injury and fatal crashes.

The Japanese have conducted ECE tests using 2 EuroSID dummies in the vehicle. The results showed much lower thorax loads on the rear dummy than the front dummy. Tests were also conducted to FMVS 214 using 2 SID dummies. In some tests the TTI and pelvic g's of the rear dummy exceeded those of the front dummy. In other tests, the reverse was found. It is intended to conduct a test using an ECE (Showa) barrier in the crabbed mode. Mr Ohmae believes that this multilayer barrier can tolerate the shear force and has reported the results of a similar test in an SAE paper approximately 7 years ago. Mr Ohmae was requested to bring the test results showing the performance of the EEVC side impact barrier face under crabbed conditions.
Mr Ohmae stated that the Japanese view was that a crabbed test was a better simulation of a car-to-car real world crash, but he believed that a perpendicular impact is more stringent for a test using a driver dummy only.
Mr Seyer remarked that if a perpendicular test is more stringent for the driver and only 14% of fatalities involved rear seat occupants then a crabbed test may not be necessary. Mr Ohmae to consider this and to respond to this suggestion at the next meeting.
The Japanese test matrix will use Nissan Sunny and Honda Accord as the test vehicles. Both vehicles comply with FMVSS 214 and ECE R95 in different variants. The Japanese (ECE) variant will be used.

GEOMETRIC STUDIES OF THE FLEET

INSIA – Structural Survey of European cars

Javier Paez from INSIA resented some results from a structural survey conducted by INSIA as part of an EEVC compatibility project (Document SIWG 78).
The survey involved 74 vehicle models sold in Spain in 1997. The distribution of masses of the vehicles was approximately “normal” (a classic bell-shaped distribution) with a mean mass of approximately 1100 kg.
The survey included a comprehensive set of measurements of vehicle structural members and the engine; vertically, laterally, distance from the front of the vehicle and the position of side structures, A, B, C pillars and sills. The results from these measurements were not presented. The thickness of structural members was not measured.

Mr Kanianthra commented that he believed it would be better to sample the extremes of distribution, instead of sampling the representative common vehicles in the fleet, as the extremes are the most incompatible.

AUSTRALIA
Mr Newland presented a summary of a recent structural survey of Australian vehicles (Document SIWG 20 – Revision 3). This survey measured the height above the ground of the bumper beam, front longitudinals, upper and lower laterals and sills of 35 recent model vehicles on the Australian market.
The results showed that the heights above the ground of longitudinals generally exceeds the height above the ground of sills, such that in a side impact there would be little or no engagement of the sills on the struck car by the longitudinals of an impacting vehicle. The front lower laterals were found to be of a similar height to the sills. However, since front lower laterals are generally situated some distance rearward of the most forward point of the longitudinals and the bumper beam, there would be significant intrusion of an impacting vehicle into the side of a struck vehicle before the lower laterals engaged the sill.

JAPAN
Mr Ohmae presented results of the Japanese Vehicle Characteristics Investigations (Document SIWG 79). This study measured the mass, geometric and stiffness characteristics of 1998 MY Japanese vehicles and weighted the results by the number of vehicles sold. The 50^{th} percentile unladen mass was found to be 1150kg. The average height above the ground of the bottom of the longitudinals was 376mm, and the top of the longitudinals was 504mm.
Mr Ohmae also showed the results from 86 crash tests into a load cell barrier face at 50 km/h. The weighted average force for all tests (weighted by sales volume) was compared with the force-deflection corridors for the EEVC side impact barrier face. The upper blocks of the EEVC barrier face (blocks 4,5,6) were considered to be quite similar to the weighted average force from the full frontal load cell barrier tests. However, the outer blocks in the bottom row of the EEVC barrier face (blocks 1 and 3) were less stiff than the crash tests results and the centre block in the bottom row was stiffer than the crash test results.

It was pointed out that the EEVC side impact barrier certification test is conducted at 35 km/h.
Mr Lowne also reminded delegates that large inertial forces are present when an object strikes a load cell wall and that these are not representative of the forces generated in car-to-car impacts.

Mr Uchimura presented some preliminary results from FE simulations conducted by Suzuki and Nissan (Document SIWG 80). These results provided force distribution information. The simulation also showed that the vehicle analysed has significant load bearing structures with ground clearance as low as 200mm. However, it was noted that this structure was the lower lateral, and all structures forward of the lower lateral would engage with a struck vehicle prior to the struck vehicle engaging the lower lateral.
Mr Uchimura indicated that further results were expected from Mitsubishi, Toyota and Honda, with a formal presentation of all results to be made at a future meeting.

OICA North America – CD of US vehicle data
Mr Hultman distributed CDs containing vehicle data from US vehicles to all members (Document SIWG 81). This information was compiled for 1997 MY vehicles by the AAMA.

TEST RESULTS

NHTSA – Side Impact Research Plan

Mr Kanianthra presented the NHTSA side impact research plan (Document SIWG 82). The main goal is to improve side crash safety in the U.S. fleet, incorporating world-wide harmonisation to the extent possible and the plan includes both near-term and long-term activities.

The near term goals are to assess the risks and benefits of side air bags, explore viability of EuroSID-2 in FMVSS No.214 and to monitor the U.S. crash environment and changes in fleet composition. Mr Kanianthra said that NHTSA were attracted by the measurement capability of EuroSID-2 and wished to include this dummy in FMVSS 214, but NHTSA will keep TTI[d] and try to measure this with EuroSID-2, possibly changing the injury assessment reference value.

The long term goals, with possible IHRA focus are:
- Real world studies
- Development of Injury Criteria
- Monitoring & Evaluation of new Dummies
- Development of injury risks and dummy injury measures
- Test Procedure Development
- Evaluation of Baseline Fleet performance
- Countermeasure Development & Evaluation
- Benefits Assessment

Mr Kanianthra explained that the FMVSS 214 pole test may be different to the FMVSS 201 pole test because of a desire to load both the head and thorax.

Mr Kanianthra also commented that ASTC had complained to NHTSA that TNO did not consider the ASTC rib design for EuroSID-2. NHTSA will test the ASTC rib, which will be one of three designs tested.
Mr Lowne advised the group that EuroSID-2 is now called ES-2.

TRANSPORT CANADA – Side Impact Dynamic Testing

Mr Dalmotas explained that Transport Canada and NHTSA had not yet evaluated the side impact crash performance of an SUV (Ford Explorer or Excursion) when impacted with the Transport Canada Hybrid barrier, however, Transport Canada had conducted a series of dynamic side impact tests which could be presented.

Mr Dalmotas presented results of dynamic side impact tests conducted by Transport Canada (Document SIWG 83). Vehicle to vehicle tests were conducted with a stationary target vehicle and bullet vehicles in either a perpendicular or crabbed configuration.

A Ford Explorer bullet vehicle was used to impact a Volvo S80 perpendicularly at 50 km/h. SID IIs dummies were used in the front and rear struck side seating positions in the Volvo. The SID IIs in the driver position was seated 2 notches rearward of the full-forward position as this was considered representative of drivers of this stature. The head curtain did not offer the driver SID IIs any protection in this test as the head passed through an arc beneath the curtain, however, there was no contact of the head to the hood of the Explorer.

The results for the US Toyota Camry (with torso side airbag) when struck by a crabbed Toyota Camry showed that this was a benign test for both the driver and rear passenger in the struck vehicle. Mr Dalmotas commented that for the Camry to Camry tests, higher penetration was observed in the perpendicular mode.

Mr Dalmotas also noted that crabbing reduced the head (HIC, peak g) and thorax (deflection, V*C, TTI) loads on the front dummy. Furthermore, the highest thoracic responses on a SID IIs seated in the rear were observed with the Transport Canada Hybrid barrier (based on the EEVC barrier, but with the centre blocks widened to make the barrier the same width as FMVSS 214) when used in the perpendicular mode, but the crabbed Explorer produced the highest V*C and TTI.

It was also noted that the real world data analysed by Transport Canada showed that the global rear occupancy rate ranged from 8% - 14%.
Mr Seyer commented that it would be difficult to justify a cost/benefit for rear occupant protection based on these figures.
Mr Lowne agreed with this comment, noting the extra difficulty that would be caused if a reduction in front occupant protection was required in order to achieve rear occupant protection.
However, Mr Kanianthra was wary of the data, arguing that if all vehicles were "failing" then it does not matter how much they fail by and therefore there would be a need to see the countermeasures first.

Mr Dalmotas explained that the Transport Canada Hybrid barrier used on a 1365 kg trolley in the perpendicular mode produced the highest thorax deflections for the rear dummy. The FMVSS 214 barrier shows a high TTI due to the corner of this barrier loading the femur of the rear dummy. However, the vehicle to vehicle tests showed that the loads on the rear dummy are due to crushing by the door and armrest and therefore TTI is not biomechanically appropriate and deflection is the best measure.

Mr Kanianthra questioned whether this test procedure was intended to be applied to SUVs as we have not conducted any tests using an SUV target. He stated a concern that research to date did not reflect the US environment. He was also unsure about the validity of results with SID IIs as BioSID, EuroSID or ES-2 responses may be different.

Mr Dalmotas told Mr Kanianthra that 2 different tests and 2 different dummies were preferred so that vehicle designs are not over-optimised.

Mr Kanianthra believed that the objective is not to maximise injuries on the dummy and therefore he was not so concerned about how severely the front dummy is exercised so long as the same countermeasures are included.

Mr Dalmotas replied that any new test procedure must exercise the front and rear dummies more than current procedures and this could be achieved with the Transport Canada Hybrid barrier.

Mr Lowne pointed out that if a crabbed configuration is used to exercise the rear dummy then the loaded area is spread due to sliding. Striking a heavier car leads to less sliding of the crabbed barrier and therefore less loading of the rear dummy. Hence, if a wider struck area is desired, this would be better achieved using a perpendicular test with a wider barrier face.

Mr Dalmotas referred to side impact test data for the Honda Accord when struck by a Ford Explorer compared to an FMVSS 214 test. He noted that the FMVSS 214 test produced higher TTI values on the rear dummy, but that this was an artefact of the FMVSS 214 barrier face. He believed that the problem with widening the barrier is that the barrier may span the pillars and therefore reduce the intrusion.

Mr Lowne commented that this could be overcome by making the corners (edges) of the barrier softer. He cited the Japanese injury data that showed that struck vehicle velocity does not affect injury outcome for struck vehicle velocities up to 25 km/h. Therefore the test condition could simulate a struck vehicle as being stationary, making crabbing unnecessary.

Mr Dalmotas said he was able to tweak his tests to get a crabbed barrier result as severe as an uncrabbed result, and was more worried about shear problems with the barrier face. This may result in an inability to get a barrier that both mimics the frontal characteristics of a real car and can cope with shear loads.

Mr Seyer summarised the discussion by saying that a possible MDB test could comprise:

- 1500 kg trolley mass (noting that the mass effect is minimal and the Japanese car fleet average approx 1150 kg; European car fleet average approx 1180 kg and the US car fleet average mass approx 1500 kg)
- non-homogeneous barrier face, based on the EEVC face, with a 1676mm width
- 50 km/h perpendicular impact
- front and rear dummies
- 2 tests: one with 350 mm and one with 450 mm ground clearance

Tests to determine kinematics of non-struck side occupants.

Australia and Transport Canada had previously proposed to conduct bilateral test/s to investigate the kinematics of non-struck side occupants, however, no tests have been conducted to date.

Transport Canada offered to bring to the next meeting the results of a reconstruction test conducted using 2 SID IIs dummies with occupant interaction.

NHTSA – MDB Simulation Studies For Side Impact Test Procedure

Mr Kanianthra reported on an investigation into the effects on occupant responses of changes to the stiffness, mass and height of the Moving Deformable Barrier (MDB) in side impact tests (Document SIWG 84).

The results presented were a finite element (FE) parametric study of MDB to vehicle side impacts. The FE model used an FMVSS 214 bullet MDB with stiffness, mass and height changes to simulate an LTV (based on ‘98/’99 Ford Explorer crash test data). The target vehicle for the simulation was a 1991 Ford Taurus with an FE model SID.

Weight was varied from 1361kg (MDB Nominal) to 1701 kg (Intermediate) and 2068 kg (Explorer).
Two stiffness values were used; nominal and a factor of 2.2 times the nominal (to simulate an LTV). The 2.2 times nominal stiffness was chosen based on an approximation from force deflection characteristics from three frontal vehicle to barrier tests of the Ford Explorer at 56, 47 and 47 km/h closing speeds. The force deflection data was derived from accelerometer data in occupant compartment because load cell wall data was not available.
Each condition was simulated with the MDB at nominal height and raised by 5, 10, 15 & 20 cm.

The conclusions from the simulations were that chest responses increased both with higher profile and increased bullet weight while pelvis response either decreased or did not change. The effect of higher profile and increased weight is more pronounced for a stiffer bullet.

Mr Dalmotas noted that the problem with the SID model is that you cannot monitor load migration.

It was pointed out that the study showed that the combined effects of geometry and mass are significant.
Mr Seyer asked whether the fact that TTI is an acceleration-based metric would mean that mass would be a predominant factor and therefore this result was to be expected.
Mr Kanianthra conceded that this was possible, but argued that TTI is a valid injury measure based on field data. He stated that TTI and deflection would show the same trends and achieve the same countermeasures.
Mr Dalmotas did not believe this was true. He cited works by Volvo, Saab, Viano and Transport Canada which all showed that TTI could be fooled. Tests conducted with armrests stiffened or removed showed that TTI and deflection trends were not in agreement. In addition, the NHTSA study to review the effectiveness of FMVSS 214 (presented earlier) showed no statistically significant relationship of TTI[d] and side impact fatality risk for 4 door vehicles since the introduction of FMVSS 214. It also showed that TTI values have not changed significantly for 4 door vehicles since the introduction of FMVSS 214. If manufacturers have introduced countermeasures for deflection, then there would be a noticeable effect on TTI if deflection and TTI show the same trends.

Mr Seyer suggested that since the NHTSA FE parametric simulation showed that stiffness was not a significant parameter, then the group should be able to harmonise on the stiffness characteristics of the barrier face.

DEVELOPMENT OF A TEST MATRIX FOR IHRA SIDE IMPACT WORKING GROUP

Issues yet to be addressed in Proposed Elements of IHRA Side Impact Test Procedure ("Strawman")

MDB Deformable Element Stiffness.
Mr Lowne commented on the force-deflection characteristics of deformable barrier faces compared with vehicles. He noted the inertial effects of a vehicle when crashed into a rigid barrier when attempting to measure force-deflection properties. He also pointed out that in a car to barrier test, stiffness based on deformation is measured, but in a side impact collision the bullet vehicle may not deform very much. Mr Lowne proposed the use of a 100mm thick deformable element in front of the load cell barrier when measuring force-deflection characteristics of vehicles.

MDB Deformable Element Ground Clearance.
Mr Justen stated that OICA Europe would find it very hard to meet a 450m ground clearance. He believed it would cause major B-Pillar redesign and possibly necessitate 2 vehicle variants to meet the 350mm and 450mm ground clearances. He also suggested that a 450mm ground clearance would penalise those passenger car fleets where there was no SUV problem. Mr Justen offered to present some information at the next meeting on the countermeasures required for 300mm and 450mm ground clearance.

Mr Hultman said that OICA North America did not believe that 450mm was an appropriate ground clearance as frontal compatibility requirements will force front structures to be lower to the ground (eg Ford blocker beams). Other proposed MDB specifications were agreeable and would achieve side impact safety improvements.
Mr Seyer was not sure that 350mm would be a sufficient ground clearance. NHTSA and Transport Canada proposed 400mm. Australia supported this suggestion and the EEVC agreed that this would be representative of the European fleet.
Mr Uchimura said that the Japanese industry would require a technical argument to be convinced of the need for 400mm ground clearance.
Mr Justen said that European industry would not be comfortable with 400mm, but he was unsure if this height was representative of the European fleet.
Mr Dalmotas reminded delegates that a typical ground clearance representative of the vehicle fleet would not be the same as the typical ground clearance of the vehicles in the fleet causing the greatest proportion of injury in side impact crashes. He agreed with Mr Justen that in some regions a 400mm ground clearance would penalise vehicles that would never be exposed to a striking vehicle with such a ground clearance. However, there was general agreement that 2 tests with different ground clearances would be undesirable.
Mr Lowne commented that 75% of MAIS 3+ injuries in side impact crashes in the UK indirectly involve the sill (the foremost structure of the striking vehicle does not engage the sill). Mr Lowne also clarified the desired test speed by saying that we would need a side impact barrier test speed equivalent to a bullet car impact speed of 50 km/h. The MDB speed may not be 50 km/h to simulate this condition.
Mr Dalmotas stated that he believed that the “range” proposal from NHTSA (leaving the selection of test parameters to be chosen from within prescribed ranges) would be very confusing for regulators.
Mr Lowne suggested that it may be useful to recommend a range in the final report, as well as pointing out the consequences of choosing values near, at or beyond the recommended range. Mr Lowne said that he believed the trolley mass had a very small effect and that the EEVC could probably agree with almost any proposal for trolley mass. He also believed there would be a good chance to harmonise on the stiffness and barrier design. Mr Lowne also stated that the group should be very careful how the recommendations are presented to GRSP.

Mr Seyer agreed that specification of a minimum that was too low would lead to levels of protection that were too low. Conversely, a specification of maximum stringency would be over-stringent for some areas, and particularly detrimental to manufacturers who sell only within a local area.

Mr Kanianthra suggested that members should canvass views from the organisations and bodies that they represent.

Mr Seyer undertook to write a summary report and circulate to members to canvass views.
Members agreed to formulate formal views from their respective organisations regarding items in the Proposed Elements of IHRA Side Impact Test Procedure (“Strawman”).

OTHER BUSINESS

Mr Newland was nominated to collate the global vehicle fleet data for the ESV report. Members were requested to provide information for this task to Mr Newland.

The issue of the IHRA website was raised once again. Mr Kanianthra said that there was no 100% guarantee of protection of data on the IHRA website (administered by NHTSA). Mr Seyer suggested that minutes and progress reports could be placed on the public side of the website. Mr Hultman and Mr Kanianthra were unsure of the suitability of minutes for the public site. There was some concern that this may inhibit candid comments and provision of information from the vehicle industry and from other in-confidence sources. It was agreed to post the progress reports on the public website. Working documents and minutes are not to be on the public site at this stage.

NEXT MEETING OF IHRA SIDE IMPACT WORKING GROUP

It was agreed to hold the next meeting of the working group in conjunction with meetings of the IHRA Advanced Offset Frontal and Compatibility Working Groups and the Vehicle Safety 2000 conference in London. The next Side Impact Working Group meeting is scheduled for 12-13 June 2000 in London, England.

The subsequent meeting was tentatively scheduled for 16-17 October 2000 in Australia in conjunction with the WorldSID workshop.

MEETING CLOSED.

CRAIG NEWLAND
6 July 2000